CLAIMS

1. A heat exchanger for vehicles, including a plurality of flat tubes communicating with an enclosed space defined by a plurality of connected closure pieces, said plurality of tubes having open ends secured to and extending through tube openings in one of said closure pieces, comprising a first corner of said defined space defined by the connected joint of three of said closure pieces where a first of said closure pieces has a first bent edge abutting an end of a second of said closure pieces adjacent a generally flat section of a third of said closure pieces, wherein said first bent edge of said first closure piece adjacent said first corner comprises a bend in a thin portion of said first closure piece having a sheet thickness which is less than the sheet thickness of the adjacent portions of said first closure piece.

2. The heat exchanger of claim 1, wherein said first bent edge comprises a flange at generally right angles to a wall member of said first closure piece which defines a side of said defined space, and said flange is generally aligned with said generally flat section of said third closure piece.

3. The heat exchanger of claim 1, wherein said one of said closure pieces include four side flanges extending generally in the direction of said tubes, wherein at least two of said flanges join at said first bent edge.

4. The heat exchanger of claim 1, further comprising second, third and fourth corners of said defined space each defined by the connected joint of three of said closure pieces, wherein:

said first closure piece includes four side flanges extending generally in the direction of said tubes and joined in a rectangular configuration with said first bent edge and second, third and fourth bent edges at the joining of the side flanges;

said second corner is defined by a connected joint of three of said closure pieces, one of which is said second bent edge of said first closure piece;

said third corner is defined by a connected joint of three of said closure pieces, one of which is said third bent edge of said first closure piece;

said fourth corner is defined by a connected joint of three of said closure pieces, one of which is said fourth bent edge of said first closure piece; and

said second, third and fourth bent edges of said first closure piece each comprise a bend in a thin portion of said first closure piece having a sheet thickness which is less than the sheet thickness of the adjacent portions of said first closure piece.

5. The heat exchanger of claim 4, wherein said first closure piece is a header.

6. The heat exchanger of claim 5, wherein said second closure piece is a first closure cap and said third closure piece is a tank closure, and further comprising a second closure cap, wherein said first and second corners are defined by connected joints of said header, said first closure cap and said tank closure and said third and fourth corners are defined by connected joints of said header, said second closure cap and said tank closure.

7. The heat exchanger of claim 6, wherein

two of said four side flanges on opposite ends of said first closure piece are fluid tight sealed to said first and second closure caps, respectively, along their length;

the other two of said four side flanges are fluid tight sealed to said tank closure along their length; and

said tank closure and said side flanges are fluid tight sealed.

8. The heat exchanger of claim 1, wherein said first bent edge at said thin portion of said first closure piece has an outer bending radii of 0.8 mm or less.

9. The heat exchanger of claim 1, wherein said one of said closure pieces is a header.

10. The heat exchanger of claim 1, wherein said plurality of connected closure pieces comprise a manifold.

11. The heat exchanger of claim 1, wherein said closure pieces are aluminum with a fluid tight seal at said first corner formed by solder.

12. A method of manufacturing a vehicle heat exchanger having a plurality of flat tubes having open ends secured to a manifold defined by connected closure pieces, said closure pieces being connected whereby a first corner of said manifold is defined by the connected joint of three of said closure pieces, comprising the steps of:

forming a thin portion of a first of said closure pieces with a sheet thickness which is less than the sheet thickness of the adjacent portions of said first closure piece;

deforming said first closure piece thin portion to form a first bent edge;

connecting said closure pieces to form said manifold, wherein said first bent edge abuts an end of a second of said closure pieces adjacent a generally flat section of a third of said closure pieces.

13. The method of claim 12, wherein said closure pieces are aluminum, and said connecting step comprises soldering said aluminum pieces together.

14. The method of claim 12, wherein said forming step comprises reducing the sheet thickness at said thin portion by about 1/3 over the sheet thickness of said adjacent portions.

15. The method of claim 12, wherein a plurality of corners are defined by the connected joint of three of said closure pieces, further comprising the steps, for each of said plurality of corners, of:

in at least one of said closure pieces forming a thin portion in an area to be at the connected joint defining the corner, wherein said thin portion for each corner has a sheet thickness which is less than the sheet thickness of the adjacent portions of said at least one closure piece; and

deforming said closure piece thin portion to form a bent edge;

wherein said connecting step includes connecting said closure pieces to form said manifold with at least one of said bent edges abutting an end of a second of said closure pieces adjacent a generally flat section of a third of said closure pieces at each of said plurality of corners.